

# PROJECT facts

DEPARTMENT OF ENERGY  
OFFICE OF FOSSIL ENERGY  
FEDERAL ENERGY TECHNOLOGY CENTER

ADVANCED CLEAN/EFFICIENT  
**POWER systems**

PS006.0697

## HYBRID SELECTIVE NON-CATALYTIC REDUCTION/ SELECTIVE CATALYTIC REDUCTION DEMONSTRATION FOR THE REMOVAL OF NO<sub>x</sub> FROM BOILER FLUE GAS

### PRIMARY PROJECT PARTNERS

**GPU Generation, Inc.**

### MAIN SITE

**Seward Station Unit #15**  
Seward

**East Wheatfield Township**  
Indiana County, Pennsylvania

### TOTAL ESTIMATED COST

**\$2,410,000**

### COST SHARING

**DOE** **\$550,000**

**Non-DOE** **\$1,860,000**

### Project Description

Environmental problems attributable to NO<sub>x</sub> emissions include acid precipitation, tropospheric ozone depletion, photochemical smog, and global warming. The Hybrid SNCR/SCR Process combines two NO<sub>x</sub> reduction technologies often considered in competition with one another. Combining the low capital cost of the SNCR process with the low ammonia slip of the SCR process achieves lower NO<sub>x</sub> emissions at lower cost than either technology implemented by itself.

With private funding, the industrial participants (listed below) along with catalyst vendors have already evaluated the hybrid SNCR/SCR process at pilot-scale on a pulverized coal-fired utility boiler at the Milliken Power Station near Ithaca, New York, during a six-month test program. The pilot tests demonstrated that 50% NO<sub>x</sub> reduction could be achieved without exceeding the threshold for ammonia slip that would cause forced outages due to downstream fouling by ammonia salts. These pilot results forecast a high probability of success for commercialization, and the participants are now pursuing full-scale testing to eliminate scale-up uncertainties and to substantiate performance guarantees for the hybrid process.

### Program Goal

Tighter environmental standards—including those imposed on ozone non-attainment areas by the Clean Air Act Amendments of 1990—are requiring U.S. coal-based power plants to be much cleaner and more efficient. DOE's Advanced Power Systems program aims to accelerate the commercialization of highly efficient, affordable technologies that support the use of coal and natural gas as reliable, low-cost energy sources while meeting or exceeding established environmental regulations.

The objective of this project is to further reduce NO<sub>x</sub> emissions from the GPU-GENCO Seward Station Unit 15 by at least 50% while maintaining an ammonia slip not to exceed 2 ppmv, the threshold for ammonia salt formation in the air preheater.

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## CONTACT POINTS

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## Project Partners

### NALCO FUEL TECH

Naperville, IL  
(process developer)

### CONSOL, INC.

Library, PA  
(commercialization assistance)

### ELECTRIC POWER RESEARCH INSTITUTE

Palo Alto, CA  
(cofunding)

### U.S. ENVIRONMENTAL PROTECTION AGENCY

Washington, DC  
(cofunding)

## Project Benefits

The SNCR/SCR NO<sub>x</sub> control process was developed by NALCO/FuelTech in response to the Clean Air Act Amendments of 1990 Title I. Compared to the current Maximum Achievable Compliance Technology (i.e., SCR), the innovative hybrid process would substantially reduce the cost of lowering NO<sub>x</sub> emissions. This project is focused on demonstrating a compliance technology for NO<sub>x</sub> that could be offered to utility and industrial boiler owners as early as 1997.

Moreover, for some applications, the maximum level of NO<sub>x</sub> reduction by SNCR is limited by high ammonia slip. By demonstrating that ammonia slip can be managed below the level typically associated with forced outages, the range of SNCR applicability is greatly expanded.

Expanded applicability and improved cost-effectiveness of NO<sub>x</sub> control is especially important for the Ozone Transport Region (OTR) consisting of the States of CT, DE, ME, MD, MA, NH, NJ, NY, PA, RI, VT, as well as DC. Ozone in this region with approximately 26 million inhabitants exceeds the National Ambient Air Quality Standards (AAQS) during the warm May-September period.

## Cost Profile

(Dollars in Thousands)

Department  
of Energy\*

Private Sector  
Partners

Prior Investment	FY95	FY96	FY97	Future Funds
—	—	\$550	—	—
—	—	—	\$1,860	—

\* Appropriated Funding

## Key Milestones

FY96	FY97	FY98
Project initiated 10/96	Construction complete 3/97	Testing complete 3/98  Project completed 12/98